REMARKS/ ARGUMENTS

The Office Action of October 17, 2006 has been carefully reviewed and this response addresses the Examiner's concerns.

I. Status of the Claims

Claims 1-21 are pending in this application.

Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doerr (US 6,956,987) in view of Volodin (US 7,031,573).

Claims 1 and 5 are amended.

Claim 6 is canceled.

II. The 35 U.S.C. §103 Rejections

Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doerr (US 6,956,987) (the '987 patent) in view of Volodin (US 7,031,573) (the '573 patent).

For the reasons given hereinbelow, Applicant states that the '987 patent and the '573 patent, separately or in combination, do not teach or disclose or suggest all the limitations of independent claims 1, 5 or 19, that there is no likelihood of success in combining the '987 patent with the '573 patent, and that combining the '573 patent with the '987 patent renders the 987 patent unsuitable for the purpose it was intended for.

The Examiner states that the '573 patent teaches a selectable grating based switching/routing subsystem making reference to reference numeral 1020 in figure 10 of the '573 patent. In describing reference numeral 1020 in figure 10, the '573 patent states that (col. 8, lines 66-67, col. 9, lines 1-210

> As shown in FIG. 10, the OADM 1000 includes a VBG element 1020 that is fabricated to reflect light 1002 having wavelength .lamda..sub.1. The VBG 1020 is transparent to light having wavelengths .lamda..sub.2, ...lamda..sub.N. The light beam 1001 from the first input 1011 is incident onto the VBG 1020 at a first angle .alpha. to a first face 1020A of the VBG element 1020. Consequently, a light beam 1002 having wavelength .lamda..sub.1 is deflected at a second angle .beta. from the face 1020A of the VBG element 1020. The light beam 1002 having wavelength .lamda..sub.1 is thus "dropped" from the input signal, and can be directed to an optical receiver 1012, such as another optical fiber, for example.

In describing how the VBG operates, the 573 patent states that (column 5, lines 56-67, column 6, lines 1-13)

> FIG. 1B depicts a transmissive VBG 112 having a grating wave vector, A, in the vertical direction as shown. An input light beam 114 composed of light of a plurality of wavelengths .lamda..sub.1, ...lamda..sub.N is directed toward the VBG 112 at a first angle .alpha. to the input face 112A of the VBG 112. The VBG 112 is formed such that it is transparent to all but one of the wavelengths. That is, the light beam propagates through the grating relatively unaffected, except that the light having a certain wavelength, .lamda..sub.1, is filtered out of the beam. As a result, only that light 116 having wavelengths .lamda..sub.2, ...lamda..sub.N continues through the VBG 112 and exits the VBG 112 at a second angle .beta. to the output face 112B of the VBG 112. Preferably, the VBG 112 is fabricated so that the angle .beta. at which the beam 116 exits the VBG 112 is as near as possible to the angle .alpha. at which it entered the VBG 112 (i.e., it continues along in a generally straight line). Light 118 having wavelength .lamda..sub.1, however, exits the VBG 112 at a third angle .gamma. to the output face 112B because of the holography within the VBG 112. That is, the VBG 112 is fabricated such that the index of refraction varies within the VBG 112 to allow light having wavelengths .lamda..sub.2, ...lamda..sub.N to continue relatively straight through the VBG 112, and light having wavelength .lamda..sub.1 to be deflected as it passes through the VBG 112 such that it exits the VBG 112 at a known angle .beta. to the output face.

The Encyclopedia of Laser Physics and Technology (available at http://www.rp-photonics.com/bragg_gratings.html) defines a volume Bragg grating as follows

> A Bragg grating is a transparent device with a periodic perturbation of the refractive index, so that a large reflectivity may be reached at a wavelength which fulfills a *Bragg condition*: the wavenumber of the grating matches the difference of the wavenumbers of the incident and reflected waves. Other wavelengths are only weakly affected by the Bragg grating, except for some side lobes in the reflection spectrum. Around the Bragg wavelength, even a weak index modulation can be sufficient to achieve nearly total reflection, if the grating is sufficiently long.
>
> Bragg gratings can be made in a bulk piece (e.g. of some glass or polymer) (→ volume Bragg gratings) or in optical fibers (→ fiber Bragg gratings), usually by irradiation with coherent ultraviolet light which is spatially modulated using an interference pattern. Volume Bragg gratings can be used e.g. as output couplers for laser diodes; the small reflection bandwidth (e.g. below 1 nm) can then lead to a narrow emission bandwidth and a low temperature dependence of the emission wavelength, which can facilitate the pumping of solid-state lasers.

There is no indication of pixellation or controllability in a volume Bragg grating. Applicant respectfully states that the volume Bragg gratings shown in the '573 patent are not

pixellated or controllable. The examiner, in the office action, referring to claim 18, states that column 3, line 12 of the '573 patent teaches means for controlling the state of each pixel. Column 3, line 12 of the '573 patent states that

> A method for controlling filter response is also provided. Such a method includes providing a mask that corresponds to a desired filter response of a volume Bragg grating (VBG) element, and transmitting a recording beam through the mask. The recording beam is transmitted through a lens to a glass that is sensitive to a wavelength of the recording beam. The lens is adapted to perform an optical Fourier transform of a transfer function associated with the mask. A second recording beam may be transmitted to the glass in combination with the first recording beam. The second recording beam may have generally the same wavelength as the first recording beam, such that the first and second recording beams are coherent.

Applicant respectfully states that the above paragraph does not describe or teach controlling a pixellated component. What would be understood by one skilled in the art by the above paragraph is best described by the inventors of the '573 patent in their published article, **VOLUME BRAGG GRATINGS** A NEW PLATFORM TECHNOLOGY FOR WDM APPLICATIONS (available at ***www.pd-ld.com/pdf/VBG_PAPER.pdf***) . Referring to Figure 1A of the above referenced article,

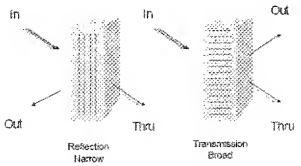

Figure 1A. Principles of operation of VBG filters – thin lines denote planes with changed index of refraction. In a reflection type, all wavelengths except the selected one pass through the filter with a minimal loss. The reflected wavelength is picked-up by a fiber-collimator assembly positioned at the proper angle. In a transmission type VBG, all wavelengths pass through the filter with a minimal loss, and only the selected wavelength is deflected to be picked-up by a fiber-collimator assembly positioned at the proper angle. Note that a VBG element can contain more than one grating in the same volume to select more than one wavelength from the multi-wavelength stream. Note also that a different wavelength[s] can be selected by angular tuning of the VBG element.

one skilled in the art would note that the definition of filter in the above figure from the article related to the '573 patent that a filter is not a pixellated controllable component. Replacing the micromachine mirror array 850 in figure 8 of the 987 patent with the transmission volume Bragg grating (element 1020 of figure 10 in the '573 patent) would have little likelihood of success since element 1020 would pass all wavelengths and deflect a selected one. In other words element 1020 of the '573 patent would not be a blocker device, which is what micromachine mirror array 850 is in figure 8 of the '987 patent.

The '987 patent, in the Summary of the Invention, column 2, lines 25-28, states that " a method and apparatus are disclosed for selectively passing or blocking an optical signal using an opaque or reflective shutter that is selectively positioned in or out of the light path." Replacing the opaque or reflective shutter with a transmission volume Bragg grating that does not selectively pass or block an optical signal would render the '987 patent unsuitable for the purpose was intended for.

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." (MPEP 2143)

If the references when combined would render the prior art invention being modified unsatisfactory for its intended purpose, there is no motivation to combine the references. *McGinley v. Franklin Sports, Inc.*, 262 F.3d at 1354; *In re Gordon*, 733 F.2d at 902.

Since the prior art references when combined would render the '987 patent unsuitable for the purpose was intended for, there is no motivation to combine.

Also, as stated above, the prior art references when combined do not teach or suggest all the claim limitations of claim 1, or 5 or 11-14.

Furthermore, there is not a reasonable expectation of success in combining the '573 patent with the '987 patent.

Applicant respectfully states that a prima facie case of obviousness has not been established and that claims 1, 5, 11-14 are patentable over the '987 patent in view of the '573 patent.

Claims 2-4 are dependent on claim 1. Claims 7-18 are dependent on claim 5. Applicant respectfully states that claims 2-4, 7-18 are patentable over the 987 patent in view of the '573 patent.

However, for completeness sake, Applicant reviews below the detail rejection of some of the dependent claims. Based on the remarks presented above regarding the controllability of the volume Bragg grating 1020 of the '573 patent, Applicant respectfully states that the '573 patent does not teach that the selectable switching/routing subsystem includes at least one pixellated switchable component or means operably connected to the selectable switching and routing subsystem for controlling the state of each pixel. As stated above, the volume Bragg grating 1020 of the '573 patent is not pixellated.

Regarding claim 10, Applicant respectfully states that while each of the rulings of the grating in gratings 820-1 and 825-4 of figure 8 of the '987 patent are parallel to each other (as they are in most gratings) the gratings in a coupler such as that shown in figure 8 of the 987 patent lie in a circle and therefore are not parallel to each other. (This design of an AWGis taught the patents of Dragone or Mahapatra).

Regarding claim 19, Applicant respectfully states that the micromachined array 850 of figure 8 of the '987 patent is a blocker where the opaque shutters are replaced by mirrors (column 5, lines 35-39, the 987 patent). Therefore, the micromachined array 850 of figure 8 of the '987 patent does not comprise "a plurality of substantially evenly spaced apart switchable transmissive diffractive gratings," a limitation of claim 19. The volume Bragg grating 1020 of the '573 patent does not comprise "a plurality of substantially evenly spaced apart switchable transmissive diffractive gratings and each of said spaced apart switchable transmissive diffractive gratings having at least one separately switchable region" and is not "capable of being selectively activated or deactivated in order to independently control which said predetermined path of said plurality of separate paths at least one of said plurality of input beams of electromagnetic radiation travels in free space," which are limitations of claim 19.

As stated above, there is very little likelihood of success in replacing the micromachined mirror array 850 of the '987 patent with the volume Bragg grating 1020 of the '573 patent and making that replacement renders the '987 patent on suitable for the purpose was intended for.

Applicant respectfully states that a prima facie case of obviousness has not been established for claim 19 and that claim 19 is patentable over the '987 patent in view of the '573 patent.

Since claimed 20 and 21 are dependent on claim 19, applicant respectfully states said claims 20 and 21 are patentable over the '987 patent in view of the '573 patent..

III. Conclusion

In conclusion, in view of the above remarks, Applicant respectfully requests the Examiner find claims 1-5, 7-21 allowable over the prior art and pass this case to issue.

No additional fees are believed to be required for the entry of this response. If additional fees are required, they should be charged to Deposit Account No. 50-3718.

In accordance with Section 714.01 of the MPEP, the following information is presented in the event that a call may be deemed desirable by the Examiner:

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Respectfully submitted,
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Dated: January 17, 2007

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